

Progress Toward Standards

Grade 7

Mathematics

Framework

1/13/03

Strand 1: Numbers and Operations

Standard 1.1: Students demonstrate understanding of number concepts.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- translating among forms for expressing large numbers, including scientific notation
- interpreting positive integral exponents and square roots
- interpreting the meanings of proportions and percents, including percents less than 1% and greater than 100%, in real-life situations
- recognizing the relationships among ratios, proportions, and percents
- recognizing and generating equivalent fractions, decimals, and percents
- ordering rational numbers and square roots
- using positive and negative integers to represent real life situations
- reasoning with regard to multiples, factors, primes, and divisibility

Standard 1.2: Students demonstrate an understanding of the concepts of operations.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- judging the effects of addition, subtraction, multiplication, and division on rational numbers as well as the effects of operations with exponents and square roots
- applying the commutative, associative, identity, inverse, and distributive properties

Standard 1.3: Students demonstrate fluency in computing and estimating.

In the grade 7 test, fluency is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- applying correct order of operations
- adding, subtracting, multiplying, and dividing with whole numbers, fractions, decimals, and integers
- computing with ratios, proportions, and percents
- estimating based on operations described above

Strand 2: Algebra

Standard 2.1: Students demonstrate understanding of patterns, relations, and functions.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- representing rules for real life and mathematical linear patterns using words, algebraic expressions, or equations
- drawing conclusions and making predictions based on patterns and relationships, both mathematical and from real life

Standard 2.2: Students demonstrate the ability to use algebraic symbols to represent and analyze situations.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- representing linear real life situations with algebraic expressions or equations
- solving linear equations in one variable with non-negative integral solutions
- evaluating expressions for given values, e.g., geometric or measurement formulas or in expressions representing real life situations
- recognizing the equivalence of expressions as they relate to the same real life situation
- recognizing the relationship between linear equations and their graphs

Standard 2.3: Students demonstrate the ability to create models to represent mathematical relationships.

In the grade 7 test, ability is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- recognizing and creating multiple representations (e.g., words, charts, algebraic expressions or equations, and graphs) of the same linear real life situation

Standard 2.4: Students demonstrate an understanding of change in a variety of situations.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- matching a situation involving a constant or variable rate of change to a graph that best represents that situation
- determining in a real life situation involving a constant rate of change how a change in one variable affects the other variable

Strand 3: Geometry

Standard 3.1: Students demonstrate understanding of two- and three-dimensional geometric shapes and the relationships among them.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- reasoning about geometric figures and the relationships among them based on their definitions and properties
- determining characteristics of and relationships among various types of triangles and angles, including vertical, complementary, and supplementary angles
- determining similarity of geometric figures based on congruence of angles and proportionality of sides

Standard 3.2: Students demonstrate understanding of coordinate systems.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- using ordered pairs as coordinates of points in a four-quadrant coordinate plane
- making connections between properties of geometric figures and coordinate geometry, e.g., given the coordinates of three vertices of a square, finding the coordinates of the fourth vertex

Standard 3.3: Students demonstrate understanding of symmetry and transformations.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- describing in words the transformation (translation, reflection, or rotation) that moves a figure from one position to another
- determining an image of a figure on the coordinate plane after a translation or reflection
- recognizing the connections between transformations and congruence, line symmetry, and rotational symmetry

Standard 3.4: Students demonstrate an ability to perform visual and spatial reasoning.

In the grade 7 test, ability is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- constructing a net (pattern) for a common 3-dimensional figure such as a prism or pyramid
- identifying views (e.g., front, top, right side) of a 3-dimensional structure

Strand 4: Measurement

Standard 4.1: Students demonstrate understanding of concepts and processes of measurement.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- selecting the best measurement strategy to use relative to the purpose of the measurement and its required accuracy
- identifying the range of possible “true” measurements, given a measurement with its greatest possible error
- using formulas to determine how a change in side length (radius) or height affects the perimeter (circumference) and area in triangles, parallelograms and circles, and the volume in rectangular and triangular prisms.
- performing conversions among measurements of area and volume, e.g., 1 square centimeter is equal to 100 square millimeters
- predicting how a change in one of the measures of side lengths, perimeters, and areas affect the other of these measurements in a triangle, square, or rectangle
- estimating equivalent measures between the customary and the metric systems based on benchmark equivalents
- making reasonable estimates of distance or height based on common benchmarks or given information, e.g., an estimate of the height of tree given a picture of a man standing next to the tree

Standard 4.2: Students demonstrate facility with the tools, procedures, and formulas of measurement.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- estimating perimeters and areas of irregular regions
- solving problems involving rates and common derived measurements, e.g., miles per gallon and cost per unit
- finding perimeters of polygons and, given the formula, circumferences of circles
- using given formulas to find the areas of rectangles, triangles, parallelograms, trapezoids, and circles as well as figures that can be subdivided into these shapes
- using given formulas to find the volumes of prisms, cylinders, cones, and pyramids
- solving problems involving scale factors, e.g., maps and enlargements made with a photocopier
- solving problems involving proportionality and geometric similarity

Strand 5: Data Analysis and Probability

Standard 5.1: Students demonstrate facility in collecting, organizing, and displaying data.

In the grade 7 test, facility is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- determining appropriate data to collect for a given purpose and how to go about collecting and analyzing that data
- selecting appropriate graphic representations for data sets
- interpreting and constructing bar graphs, pictographs, line graphs, line plots, stem-and-leaf graphs, circle graphs, frequency charts, histograms, and box-and-whisker graphs
- recognizing how different representations of the same data set can affect interpretation

Standard 5.2: Students demonstrate an understanding of statistical methods.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- calculating the mean, median, mode, and range of a data set and interpreting their meanings relative to the data set
- making judgments regarding the shape and spread of data sets, including consideration of outliers and quartiles

Standard 5.3: Students demonstrate the ability to draw conclusions and make inferences based on data.

In the grade 7 test, ability is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- drawing conclusions and making inferences and predictions based on data given in charts and graphs

Standard 5.4: Students demonstrate an understanding of probability.

In the grade 7 test, understanding is demonstrated with the following indicators as well as by solving problems, reasoning, communicating, representing, and making connections based on the indicators—

- determining all possible outcomes for an experiment, using a tree diagram, an organized list, or, when appropriate, the fundamental counting principle
- finding the theoretical probability of a event in experiment with equally likely outcomes
- finding theoretical probability involving simple independent events
- finding the empirical probability of an event, given a set of data
- making predictions based on probability